



Summary of *Diet and Breast Cancer: A Review of the Prospective Observational Studies*

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Many people have wondered whether the large international variation in breast cancer rates is partly due to differences in diet in different cultures. Some foods might, hypothetically, decrease risk by acting as antioxidants or anti-estrogens. Other foods might increase risk by increasing levels of estrogen, insulin-like growth factor 1, or other growth factors. Foods might also influence risk by affecting DNA mutations or repair, or through the metabolism of chemicals. An individual's energy balance -- the interplay of calories consumed, physical activity, and metabolic rate -- is another important way that diet may affect breast cancer risk through mechanisms we don't entirely understand.

Methodology

In order to evaluate the state of knowledge about associations between diet and breast cancer, we searched the US National Library of Medicine PubMed database for human studies on this topic. We considered dietary factors that, based on their nutritional composition, are of particular interest in the context of breast cancer: fat intake, biomarkers of fat intake, fruits and vegetables, antioxidant vitamins (vitamin A, C, E and beta-carotene), serum antioxidants, carbohydrate intake, glycemic index and glycemic load, dairy consumption (including vitamin D), soy products and isoflavones, green tea, heterocyclic amines, and adolescent diet.

We selected for review the studies that enrolled healthy women and assessed their diets at baseline and followed women recording who developed breast cancer during the follow-up period. These studies (called prospective studies) provide stronger evidence on any link between diet and breast cancer than studies that ask women with breast cancer and women free of breast cancer to recall their diet from the past. Few studies randomly assigned women to eat different diets because, as a practical matter, it is difficult for women to follow the assigned diets over many years.

The possible association between diet and breast cancer is challenging to study for a number of reasons. One of the key challenges is that it is so difficult to carefully assess what nutrients a woman consumed over her lifetime. Dietary assessments always involve some error. Researchers also have a difficult time knowing exactly what aspects of diet to evaluate.

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Results

A large number of studies have addressed the association between diet and breast cancer. The risk of breast cancer can be reduced by avoiding being overweight and gaining weight in adulthood, as well as by limiting the consumption of alcohol. The effect of alcohol may be neutralized by folate supplements.

However, among the prospective human studies on diet and breast cancer incidence and gene-diet interactions and breast cancer incidence to date, there is no other association that is consistent, strong, and statistically significant. The apparent lack of association between diet and breast cancer may reflect a true absence of association or may be due to errors in capturing dietary histories, a lack of long-enough follow-up time, and a focus on diet in adulthood rather than childhood. Additional details of study results for specific nutrients are found in the review article.

Future Research

Future studies may continue to improve the methods for monitoring diet. New studies also are needed in several areas that have received little attention to date: the effects of diet in early life, especially adolescence; effects of diet on premenopausal breast cancer and on various tumor types; diets that differ more radically from typical US foods; and diets with lower levels of pesticides and industrial contaminants such as organic foods. More evidence is also needed on the role of vitamin D, animal fat, high-fat dairy foods, and soy intake. In addition, studies are just beginning to take into account interactions between genetic variations and diet, and additional research is needed for genes that have been shown to induce biological changes related to the development of cancer.